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ABSTRACT

The materials in this educational packet are designed for use with students in grades 4 through 7. They consist of an overview, teaching guides and student data sheets for three activities, and a poster. The overview discusses the city as an ecosystem, changing urban habitats, urban wildlife habitats, values of wildlife, habitat management, and encouraging wildlife in urban areas. A glossary and list of reference materials are included. The teaching guides contain a list of learning outcomes, instructional strategies, a list of materials needed, and an activity review sheet (with answers). In the activities, students: (1) learn how the urban environment support wildlife; (2) examine some of the effects of urban pollution on wildlife and human environments; and (3) develop a management plan to increase species diversity and encourage wildlife in the city. The poster illustrates two sites where peregrine falcons are known to rest (a mountain cliff and the ledge of a tall building) and the variety of wildlife in the city. Instructions for two additional activities are included: keeping a log of wildlife seen in the city and a maze puzzle involving a squirrel going through a city to reach a park. (JN)

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Urban Areas Habitat Pac

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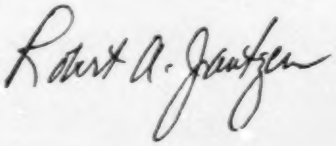
A Message To Educators

The Fish and Wildlife Service manages millions of acres of land, conducts wildlife research, raises fish for restocking depleted waters, and performs hundreds of other tasks designed to benefit fish and wildlife resources. However, as important as these activities are, we realize that in the long run an informed, motivated, and involved public can do more to benefit wildlife than all of our management activities.

This education package represents an important step in our efforts to provide teachers and other educators with factual information about wildlife, habitat, and resource management. We hope that you find these materials useful and that you will encourage your students to learn more about America's wildlife heritage.



Robert A. Jantzen
Director
U.S. Fish and Wildlife Service

These materials are designed for use with students in grades four through seven.

Contents

Leader Overview
People are part of nature and need nature around them, even in the concrete canyons of modern urban complexes. And nature need not be far away from the very heart of cities, if we keep our cities livable for people *and* wildlife.

Poster: Side 1
Peregrines are back! Here are two sites where peregrine falcons are known to nest: on a mountain cliff and on the ledge of a tall building.

Poster: Side 2
You would be surprised by the variety of wildlife that makes the city its home!

Student Page 1: City Maze
Follow this squirrel past many urban hazards to find a park to live in.

Student Page 2: Wildlife Log
Students can observe wildlife in the city and keep a wildlife log.

Activity 1: Urban Habitats
Urban areas are human-maintained systems that provide for the needs of people. In this Activity students examine how the urban environment also supports wildlife.

Activity 2: Pollution Meters
Urban pollution displaces or damages some plants and wildlife. Some organisms can serve as pollution indicators. Here students learn about some of the effects of urban pollution on wildlife and human environments.

Activity 3: Improving City Habitat
Wildlife has an esthetic value to many people. People can take actions that encourage the presence of wildlife. Students develop a management plan to increase species diversity and encourage wildlife in the city.

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U.S. Fish and Wildlife Service

National Institute for Urban Wildlife

The mission of the National Institute for Urban Wildlife is to be a responsible and effective scientific and educational organization advocating the enhancement of urban wildlife values and habitat and the wise use of all natural resources for the benefit of people in cities, suburbs, and developing areas.

The Institute is the only private national conservation organization with programs dealing almost exclusively with fish and wildlife in urban and other disturbed areas. Funded through private and corporate contributions, grants and contracts, it is filling some of the glaring gaps in information and methodologies needed for the management and enjoyment of wildlife and wildlife habitats in urban areas.

The Institute accomplishes its mission by (1) conducting sound research on the relationship between man and wildlife under urban and urbanizing conditions; (2) discovering and disseminating practical procedures for maintaining, enhancing or controlling certain wildlife species in urban areas; and (3) by building an appreciation for, and understanding of, wildlife and a positive conservation ethic at the local community and neighborhood level, and illustrating how all segments of our people have a vested interest in wildlife and the environment we mutually share.

Developed by the U.S. FISH AND WILDLIFE SERVICE/DEPARTMENT OF INTERIOR
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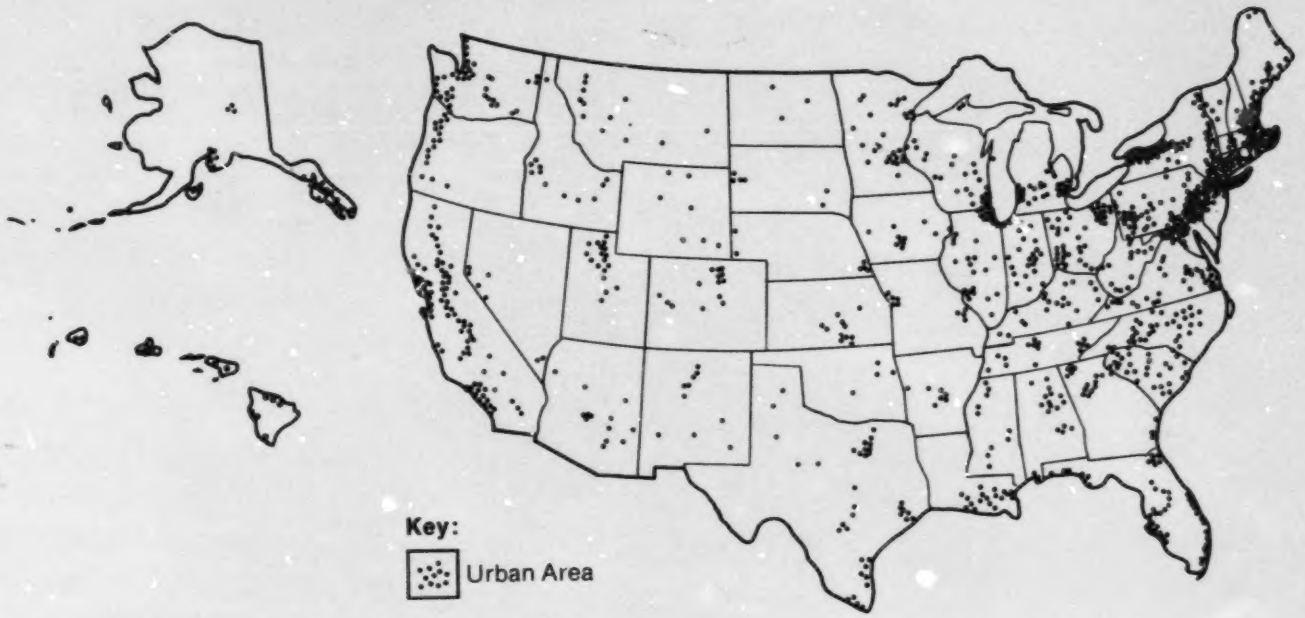
Principal Urban Areas in the United States



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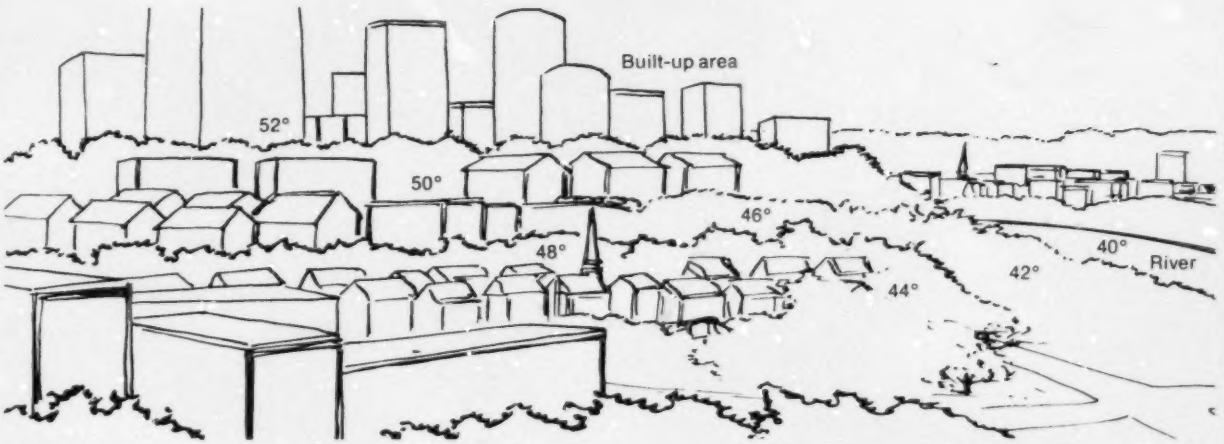
Urban Areas

Leader Overview



Distribution of minimum temperatures in a city environment

"It is not a choice of either the city or the countryside; both are essential, but today it is nature, beleaguered in the country, too scarce in the city which has become precious."

—Ian McHarg
Design With Nature

The City Ecosystem

A city is an **ecosystem**. Like all ecosystems, it is a place where living things interact with their environment and with each other. It is, however, a "cultural" or human-maintained system built by people primarily to fill their own needs. Unlike most ecosystems, the city requires vast inputs of energy, food, and raw materials to supply the concentrated human population.

The urban **habitat** has changed dramatically throughout history. Early cities were small by today's standards and closely integrated with the surrounding countryside. Formerly, cities procured most of their food and fuel from nearby farms and forests. Some animals from adjacent habitats freely colonized or roamed in the cities.

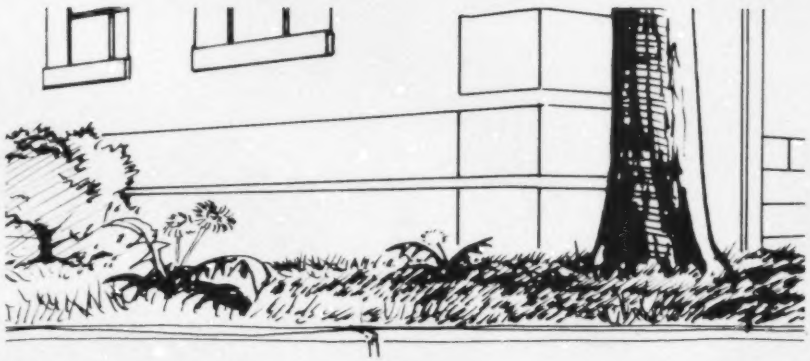
Changing Habitat

Major changes took place in city ecosystems as they grew. Large human populations could no longer be supported by nearby resources. Food, fuel, and building materials had to be brought in from distant places. The city ecosystem was no longer locally self-contained. Improved transportation and the growing population, together with poor planning, led to "urban sprawl"—spreading the city environment over vast areas.

Urbanization causes major changes in both the biological and physical components of existing ecosystems. Trees, shrubs, and other plants are largely removed, and soil is covered with concrete and asphalt for buildings, roads, and parking lots. Unpaved soil is packed hard by people walking over it. The water cycle is altered as rain runs rapidly off the impermeable surface and as wetlands are drained and filled for development. Roads criss-cross the habitat, dividing it and restricting free movement of wildlife. Air and water quality are degraded by city wastes.

Temperature patterns change as cities become "heat islands" that are often several degrees warmer than the surrounding countryside. This occurs because city structures absorb and radiate more of the sun's heat than do natural landscapes. Most rainwater runs off and is unable to cool the air by evaporation. The burning of fossil fuels in cities also generates heat.

Urbanization destroys or modifies existing natural habitats and creates new ones. Changes in living conditions naturally influence the kinds of plants and animals that can live in an area. The species that establish themselves in the new habitats may be quite different from those that existed there previously.



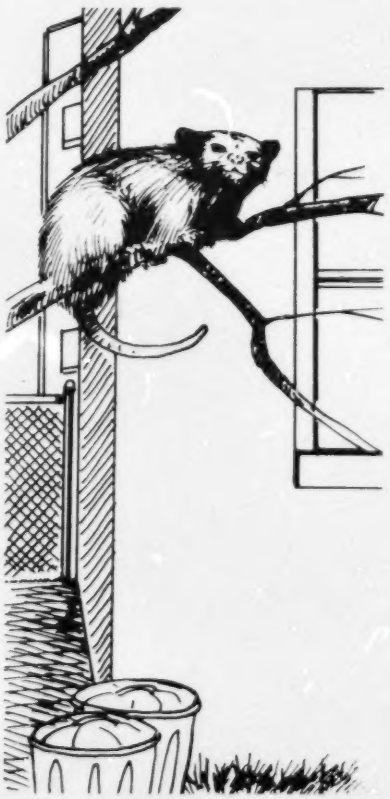
Dandelion

The shift of species is accentuated by accidental introductions and the human penchant for importing exotic plants and animals from distant places. Introduced trees and other plants, many of which can tolerate urban pollution, soil compaction, and lack of water, are often planted instead of native species. Thus, in urban areas you may find eucalyptus from Australia where **chaparral** once grew. Where a maple forest once thrived, dandelions from Eurasia and London plane trees (hardy hybrids of American sycamore and oriental planes) now grow.

Urban Wildlife Habitat

Wildlife and people have the same basic needs—food, water, shelter, and places to raise their young. Animals that survive best in the urban environment are those with flexible behavior that can adapt to the food sources and living sites found in the city and can tolerate human disturbance. Introduced animals such as starlings, pigeons, rats, and cockroaches have adapted so well that many people consider them pests rather than desirable wildlife. Their massive numbers can cause health problems.

Many other species can and do coexist peacefully with people in city ecosystems. "Concrete canyons" have become nesting and roosting sites for cliff dwellers from the wild. Chimney swifts trade roosts in hollow trees for city chimneys. Nighthawks nest on flat-topped buildings. Bats move out of caves and into belfries. Some songbirds move to city parks and around homes. Peregrine falcons used to nest on high city ledges, feeding on pigeons and starlings, until pesticide accumulations in their prey began to lower their reproductive success. Thanks to pesticide regulation and careful breeding programs, peregrines are slowly beginning to recover and may again grace our cities. Adaptable mammals like raccoons and opossums scavenge human garbage and live in urban attics or garages. These and other animals adjust to existing city conditions.



Opossum

More animals live where people give consideration to the needs of wildlife within city surroundings. The greatest diversity of animals is found where habitat provides many and varied sources of food and **cover**. In cities, habitat diversity is often drastically reduced. Most plants that would provide wildlife with food and cover no longer grow in the city. Remaining plants are pruned and tended in a quest for order in the confined space. This greatly reduces their value to wildlife. City planners and residents are beginning to realize the values of wildlife. As a result of this increased awareness, some people are planting trees, shrubs, and flowers that attract wildlife.

Sharp-shinned hawk

Values of Wildlife

Given a chance, wildlife will thrive in and near cities. People are acting wisely when they encourage populations of plants and animals because they are also benefiting themselves. There are recreational and educational benefits. Seeing wildlife can become part of everyday city living rather than being reserved for an occasional trip to the country.

Environmental problems, such as pollution, are reflected in the disappearance of many plants and animals. Fish and bottom-dwelling (benthic) organisms destroyed by water pollution indicate that rivers cannot be used for swimming and that the water requires chemical treatment before it is safe to drink. The decline of the peregrine falcon warned of pesticide buildup. **Lichens** and most evergreen trees cannot tolerate air pollution, and their disappearance in cities should also be cause for concern. The existence of a wide variety of plant and animal species is indicative of a healthy and ecologically stable environment.

"The function of plant life and wildlife of the city . . . is of peculiar importance to people. If [these] habitats of the city are healthy, if they are viable ecosystems with vigor and stability, then the indication is that the biological quality of the environment is high for people as well. . . . A city's wildlife can indicate the direction of urban processes—toward healthy diversity and balance, or toward sickness and stagnation.

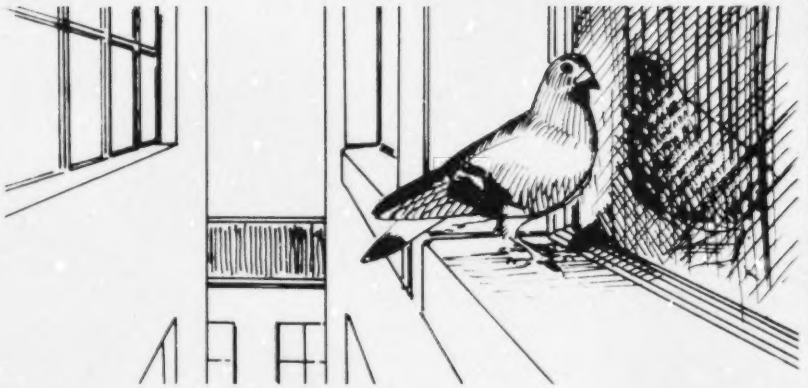
"The presence of songbirds, squirrels, and other animals that are pleasing to the ear and the eye, the presence of bass, pike, sturgeon and other desirable game fish, all tell us a great deal about man and his ecosystem. On the other hand, if man's companions are lice, vermin, and the trash fish of his polluted streams, we can deduce much about the way he manages his ecosystem."

—Theodore W. Sudia
Wildlife and the City

A healthy and pleasant environment for people will naturally support a variety of other life.

Habitat Management

Through the type of habitat they create, people influence the types of wildlife in the city. We can design our cities to control **undesirable species** and encourage desirable ones. Buildings can be designed without ledges, which are favorite nesting places for pigeons. Careful food storage and garbage disposal remove a major food source for rats and mice.



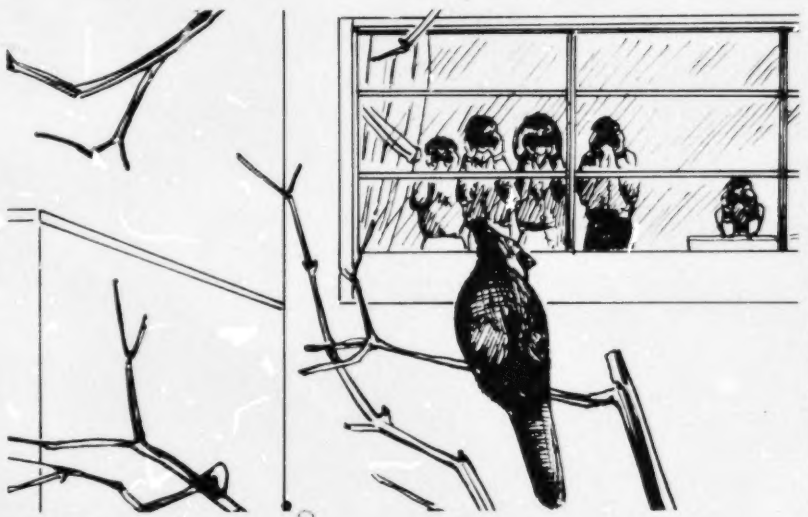
Pigeon

Encouraging Wildlife

Even now many species exist in cities and suburbs—many more than most people realize. What can be done to stimulate these populations and encourage new ones? One key to increasing desirable urban wildlife is to create sufficiently diverse habitats to provide the varied sources of food, water, and shelter that animals need to survive. Other important steps are to control pollution and contamination.

Urban "green spaces"—parks and cemeteries– are traditional wildlife havens. Here, in the heart of our major cities, is some semblance of a natural environment. Over 200 species of birds feed or nest in New York City's Central Park. Sharp-shinned hawks have been seen feeding their young in the nest at a Boston cemetery. Coyotes live in remnants of chaparral in Los Angeles. In parks, squirrels scamper between trees and become tame enough to beg for handouts. Rabbits nibble on grass close to the cover of shrubs. These "green spaces" are valuable wildlife habitats. This is especially true when they are interconnected and accessible from open country through sheltered corridors or **greenbelts**.

Urban nature is not, however, confined to parks. Potential habitat pockets abound,



especially for birds that can fly about to find them. Portions of yards or vacant lots planted with berry bushes or left as small meadows bring rewards of orioles, finches, and waxwings. Birdhouses and feeders are popular ways of attracting songbirds. If you feed birds in the winter, remember that once you start you must continue feeding them through the entire season that food is scarce. Otherwise, birds that have come to depend on you may starve. Winter feeding should continue until natural foods are available in the spring. Provide drinking water when the weather is dry.

One of the most innovative concepts for city wildlife habitat is the rooftop refuge. Rooftops that are strong enough can be moisture sealed and covered with soil. Grasses, shrubs, and even trees can be planted. Birds, reptiles, insects, and other small animals could inhabit these parks for people to enjoy.

The visionary naturalist, Aldo Leopold, wrote: "There are some [people] who can live without wild things and some who cannot. . . . Like winds and sunsets, wild things were taken for granted until progress began to do away with them."

It is generally assumed that modern city dwellers can do without wild things. This is not true. People in city ecosystems demonstrate their need to be in touch with plants and animals through their interests in houseplants, aquariums, and pets. This deep human need could be served much better if city design included planned wildlife habitats and unpolluted conditions wildlife and people need for good health. What is good for plants and animals is generally good for people.

Glossary

chaparral—An area of limited rainfall characterized by scrubby, broad-leafed evergreens.
cover—Anything that provides wildlife with shelter or protection from predators and weather.
ecosystem—A system involving all interactions of living and non-living components of a given area.
greenbelt—A vegetated strip of land that creates a buffer zone in a developed environment.
habitat—The place where an organism lives and supplies its life requirements—food, air, water, shelter.
lichen—A small plant, composed of an alga and fungus living together, that grows on solid surfaces like rocks and trees.
particulate air pollution—Minute particles of solids or liquids in the air; e.g., soot, dust, smoke.
undesirable species—Plants or animals that have become pests and may spread disease or damage structures.

Resources

General References

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For Young Readers

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"Life in a City Lot," Anonymous. ***Ranger Rick's Nature Magazine***, National Wildlife Federation, Washington, DC, October 1972, pages 18-21.
Save the Earth, Claire A. Nivola. Alfred A. Knopf, New York, 1974.
Wild Green Things in the City, Anne Ophelia Dowling. Thomas Y. Crowell Co., New York, 1962.

Films and Filmstrips

Urban Forest, Kansas State University, Manhattan, KS, 1976.
Wild Green Things in the City, Paramount Communications, Hollywood, CA, 1974.

Projects

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Purpose

In this Activity students survey, compare, and evaluate different urban sites as habitats for people, plants, and wildlife. They learn that human and wildlife habitats must fill certain similar needs. This study leads the students to a clearer understanding and expression of their feelings about plants and animals in the city.

Learning Outcomes

After completing this Activity, students will be able to:

A. Identify two ways in which urbanization harms habitats.

B. Identify two ways in which urbanization can improve habitat for wildlife.

C. Identify three kinds of wild plants and animals that are able to thrive in the students' urban area, and explain one way in which urban conditions favor these species.

Organization

Who: Groups of two or three

Where: Two urban sites—one "developed" (e.g., parking lot, business area) and the other more "natural" (e.g., park, cemetery)

When: Spring, summer, fall—a sunny day if possible

Time: 3 to 4 hours (can be broken into several shorter trips if desired)

Safety: A word of caution is necessary regarding field trips in urban locations. Discuss traffic hazards and remind students to stay with their group.

Gray squirrel

Materials: For the Class

- Field guides (optional)
- Pictures of an undeveloped area in your region; if possible, historical pictures taken in your urban area before much development took place

Materials: For Each Group

- Thermometers (sunny day activity)

Materials: For Each Student

- Student Data Sheet
- Pencil
- Clipboard (Masonite or stiff cardboard with paper clip or binder clip)

Directions

1. Display pictures of undeveloped areas on the bulletin board. Introduce the concept of habitat. Ask the students to define the word "habitat" (the place where a plant or animal lives and finds the conditions it needs to survive, such as food, water, shelter). What is a student's habitat?

2. In creating urban habitats, people have changed the previously existing habitats. Ask the students to compare the pictures of undeveloped areas with their urban habitat. List some factors that have changed and some that have remained the same. Include biological factors (e.g., plants are removed permanently when large areas are paved) and physical factors (e.g., water is less available when rain is carried off in sewers). Involve the students in selecting two sites for study, one natural site and one site that is highly developed.

3. Take the students out to the sites, break into groups, and distribute materials. Take extra Data Sheets if you want the students to study and compare more than two sites.

4. Using the Data Sheets as guides, have students survey the habitats they are visiting. They should name or draw plants and animals they see, or use field guides to check identifications and other facts. (Field guides for many subjects—plants, birds, mammals, reptiles, insects—are available from libraries.)

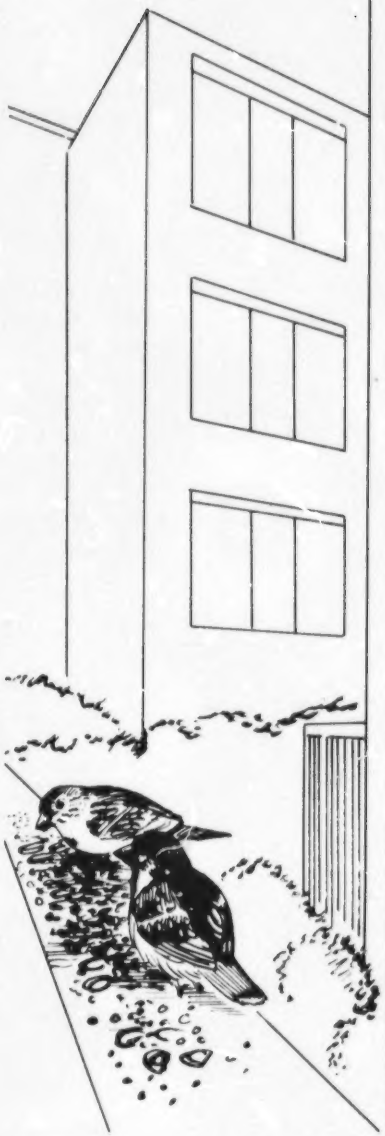
5. When the Data Sheets are completed, gather the students to compile profiles of the animals and plants that could live in the habitats they surveyed. They should share their own data with the class (or with their small group) to determine the following information: Where can the animal find its food? Are there natural food sources? Must the animal depend on human-provided supplies (including garbage)? Could an animal that was disturbed by noise live here? Is there a variety of food to eat and places to hide? Consider all the factors on the Data Sheet.

How many and what kinds of animals and plants were seen in the different habitats? How do living conditions compare in the habitats? Following this survey, encourage students to begin keeping their wildlife logs (see Student Activity Page 2).

Followup

Some of the animals that survive best in the environment are not those that people enjoy having around. Animals like rats, cockroaches, pigeons, starlings, etc. are considered pests by many people.

List urban habitat conditions that favor these "pest" animal populations (e.g., availability of food, cover, and nesting space). How might habitats be changed to control them (e.g., clean up garbage, design buildings with fewer nesting opportunities)? What conditions favor animals or plants that the students find desirable (e.g., nut-bearing trees encourage squirrels, berry-producing shrubs encourage birds and provide protection from dogs and cats)?



House sparrow

Review Answers

1. and **2.** Answers will vary depending on what the students saw on their field trips.

2. The city maintenance personnel may water and fertilize plants; many city animals live in vacant buildings and feed on garbage or handouts; owls and snakes eat rats and mice; insects are attracted by city lights and provide food for birds (e.g., nighthawk) and bats.

3. When a parking lot is built on a vacant lot or in a park, the rain that falls there will run off into sewers instead of soaking into the ground. Water that soaks into the ground is available to nearby plants and animals; and when water evaporates from the ground, it helps cool the area.

4. True. The asphalt used for paving absorbs more of the sun's heat than grass or other plant ground cover.

5. Examples:

- Danger from traffic
- Different or scarcer food sources
- More human disturbance
- Limited cover
- Water supplies that may be scarcer or polluted

Name:

1. List three kinds of plants or animals found in your city.

a. _____

b. _____

c. _____

2. Tell how one of these plants or animals survives in the city habitat. (How does it fill one of the needs listed on your Data Sheet?)

_____

_____

_____

3. A park or vacant lot is paved for a parking lot. How does this change what happens to the rainwater that falls there?

_____

_____

_____

4. Is this sentence true or false?

Paved areas become hotter on sunny days than areas where the ground is covered with plants. (Circle your answer.)

True **False**

Why? _____

_____

5. An animal taken from a local park is freed in your city. Name two changes that it might have to deal with in the new habitat.

a. _____

_____

b. _____

_____

Urban Areas

Activity 2

Pollution Meters

Purpose

In this Activity students discover that some of the changes people cause in habitats are unhealthy to plants, other animals, and people themselves. The students survey for physical and biological indicators of urban pollution and learn how pollution affects living things.

Learning Outcomes

After completing this Activity, students will be able to:

A. State two ways in which wild plants and animals can be useful indicators of a healthy urban environment.

B. Express on an attitude scale their understanding of the unhealthy effects of the city environment on wildlife and humans.

C. Draw a picture depicting indications of pollution (e.g., a weathered headstone or a dying tree).

D. State two actions they can take to make the city a healthier environment for people and wildlife.

Organization

Who: Groups of two or three

Where: Urban sites—streets, parking lots, parks, cemeteries, industrial sites

When: Fall (preferred), spring, summer

Time: 4 hours—may be divided into shorter periods over several days

Safety: A word of caution is necessary regarding field trips in urban locations. Discuss traffic hazards and remind students to stay with their group. Part of the Activity involves using a cold car exhaust pipe. Discuss the need to be careful of hot exhaust pipes and of breathing exhaust fumes.

Materials: For the Class

- Jar of petroleum jelly
- pH test kit (available from science supply store or pet shop)

Materials: For Each Group

- Glass slides (or plastic yogurt carton tops or white cardboard)
- Old white sock
- Jars and funnels for collecting rain

Materials: For Each Student

- Student Data Sheet
- Pencil
- Clipboard (Masonite or stiff cardboard with a paper clip or binder clip)
- Hand lens (optional)

Directions

1. The primary goal of this lesson is for students to learn some effects of pollution on both wildlife and people. Discuss with them what pollution is, how they have experienced pollution, and how they think it affects other living things.

2. Divide the students into groups. Distribute the Data Sheets and materials. Students will observe various pollutants, following the directions below, and record their observations in the first column of the Data Sheet. The first five activities are printed on the Data Sheets.

You may choose three more to fill the blank categories.

a. Particulate air pollution (see Glossary in Overview). Coat one side of a glass slide (plastic yogurt top, etc.) with a thin layer of petroleum jelly. Leave it exposed outdoors (e.g., on a window ledge, tree, or curb) for 24 hours. Examine the particles stuck to the slide (with a hand lens, if available). This activity may be repeated at different times or in different places to check for variations in the pollution level.

Acid rain damages stone.

b. Acid pollution (from sulfur dioxide [SO_2], which is often emitted in burning fossil fuels). Collect rainwater running off trees (some increase or decrease in pH may occur because of deposits on trees). Neutral pH is 7. The average pH of rainwater depends on location. In industrialized nations it is between 4.0 and 4.5. In some areas rainfall may be as low as 3.2 or as high as 7.0. Many plants and animals cannot tolerate a pH below 5.5. (Note: Inexpensive pH kits may not show a substantial difference between rainwater and tree runoff.)

c. Noise. Arrange the students 1 m (3 ft) apart near street traffic or some other usual city noise. They should try to talk to each other without raising their voices. If they cannot hear each other clearly, the noise is potentially harmful.

d. Air pollution from automobiles. To demonstrate auto pollution, tie an old white sock or other white material over a cold exhaust pipe. Run the car for 2 minutes. Carefully remove and examine the sock. Also tell the students that some harmful parts of the exhaust are invisible gases. Car exhaust contains carbon monoxide (CO), nitrogen dioxide (NO_2), and hydrocarbons; exhaust gases can be converted by sunlight into ozone (O_3).

e. Oil. Can the students find oil spots on streets or in parking lots? What happens to this oil when it rains? (Some washes into storm sewers.) Where may it eventually end up? (Storm sewers frequently discharge into streams or rivers.)

Optional Observations:

f. Acid pollution (sulfur dioxide). Acid rain dissolves some types of stone, particularly limestone. Record signs of rapid weathering of statues, gravestones, or building stones.

g. Air pollution (general). The students can discover and record the daily air quality index if it is published in the local paper or given over the radio. Investigate how the index is computed and what it measures.

h. Air pollution. Examine leaves for soot covering and for dead (brown) spots. These signs are often indicative of air pollution.

i. Dog wastes. Students should note the presence of dog wastes on the streets or sidewalks. Is there much of it? This waste is often washed (untreated) into local rivers.

j. Water pollution (industrial or municipal wastes). If there is a safe place to walk along a river, the students should check the banks for discharge pipes. Are wastes being added to the water in this way? What other signs of pollution can they see (garbage, scum on the water surface, etc.)?

Sulfur dioxide damage to a white pine

3. After the students have observed and recorded signs of pollution, they should research its effects on living things. They should gather information to fill in the remaining columns on their Data Sheets. This can be done by having speakers come into the class, obtaining information from local health and wildlife organizations, or by library research (see Resources). Research or speakers should center on pollutants the students have actually seen, such as the following examples.

Examples of pollution effects on animals (often similar to effects on humans):

- Particulates in the air are harmful to swifts, which feed on insects by flying with their mouths open. Soot-coated vegetation supports fewer insects.

- Acid pollution in rivers eventually kills fish and other aquatic life. Sulfur dioxide has been shown to decrease reproduction in rabbits. Lichens cannot survive in acid areas. Most cities adjust pH of drinking water through costly chemical treatment.
- Laboratory studies of overcrowded mice have shown fetal reabsorption and cannibalism.
- Carbon monoxide cuts down the amount of oxygen carried in the blood and may destroy brain cells and retard metabolism.
- Ozone has been shown to cause lung damage in rabbits.
- Oil and hydrocarbons affect birds. Many have been killed by oil on their feathers and hydrocarbons in their bodies. Oil on eggs, sometimes rubbed off from the parents' bodies, can prevent eggs from hatching.
- Lawn and garden pesticides may kill birds.
- Water pollution (industrial wastes, dog wastes) poisons fish and other aquatic organisms.

Sources of Information:

- The U.S. Environmental Protection Agency
- Doctor or nurse (school health official)
- Veterinarian (particularly at a local zoo)
- Public health organization
- American Lung Association
- ***Caring for Trees on City Streets*** (see Resources) discusses problems encountered by trees in the city—including pollution. Also included are things the students can do to help.
- Local City Parks Department (e.g., Urban Forester)
- Conservation organizations (e.g., local Audubon Chapter)

4. When the Data Sheets are completed, the students should compare the effects of pollution on animals and people. Stress that the presence of healthy wildlife and plants will indicate an environment that is also healthy for people.

Followup

Students may want to engage in projects to help clean up pollution. Information is available from local civic or environmental groups or in publications such as ***Save the Earth*** and ***Projects in Conservation*** (see Resources).

Review Answers

1. Students should list two of the harmful effects of pollution they discovered in their research (e.g., lung damage, hearing damage, loss of plants and animals).

2. Although **c.** is the most nearly correct answer, this question asks for an opinion and should not be graded right or wrong. Use the students' answers to generate a discussion about pollution and wildlife in the city.

3. Students should name two sources of pollution they have studied (e.g., automobiles, factories, power plants).

4. Students should talk about specific projects they could do as individuals or as a class. For example, if the student's family has a car, make sure it is well tuned, or conserve energy at home so that less fossil fuels will be burned.

5. Answer **a.** is an incorrect statement. Even if plenty of food and water is available, plants and animals may suffer from pollution.

Name:

1. Name two ways in which pollution can hurt people and wildlife.

a. _____

b. _____

2. Circle the letter by the statement you agree with most.

a. It doesn't matter if wild animals in the city are killed by pollution because animals should live in the country.

b. It doesn't matter if pollution hurts wildlife, as long as it doesn't hurt people.

c. If pollution hurts wildlife, it probably isn't good for people either.

3. What are two sources of pollution in your city?

a. _____

b. _____

4. To help clean up pollution in my city, I can: (Tell about two things *you* could do to help stop pollution.)

_____

_____

_____

_____

5. Which of the following statements is *not* correct? (Circle your answer.)

a. As long as there is enough food and water, city animals and plants will be healthy.

b. Many fish found dying or dead in a local river can indicate poisoning or pollution of the water.

c. City trees and other plants can be injured and even killed by air pollution.

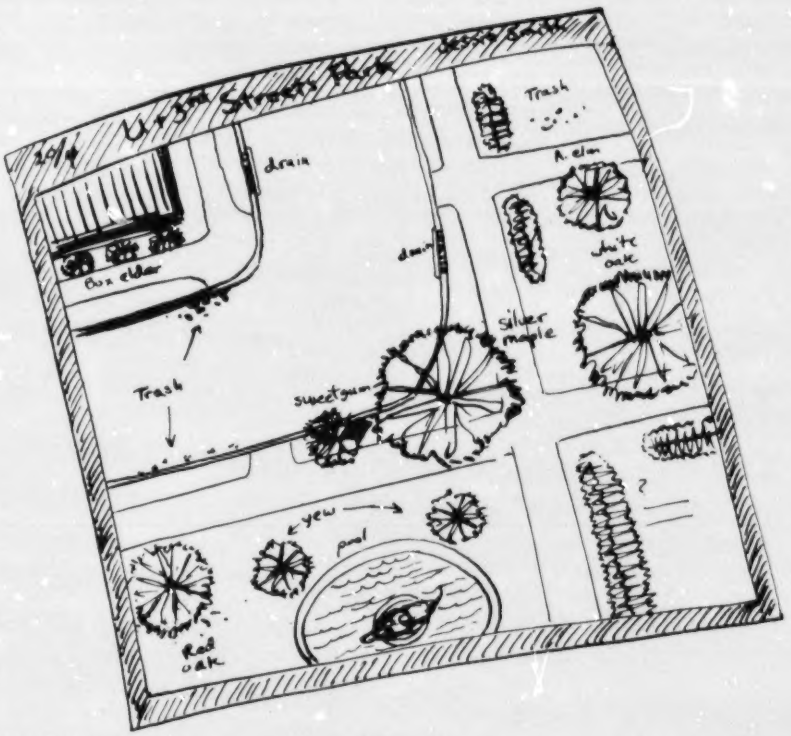
d. A small amount of oil on a nest of eggs may prevent them from hatching.

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Urban Areas

Activity 3

Improving City Habitat



Student map

Purpose

In this Activity students learn how people can take action to encourage wildlife in their cities. Students investigate specific techniques used to improve urban wildlife habitats. They have a chance to apply these techniques using a habitat improvement plan they develop for a small local park, lot, or yard.

Learning Outcomes

After completing this Activity, students will be able to:

A. Name three kinds of wild plants or animals they would like to see more of in their city and discuss ways to increase the populations of those species.

B. State three ways wildlife numbers can be increased or decreased in their city.

C. Draw a plan (map) to improve an area for wildlife by increasing diversity in the habitat and by removing oil, garbage, or other pollutants.

Organization

Who: Part 1—whole group
Part 2—groups of three or four
Where: Meeting room and yard, park, or vacant lot
When: Spring or fall
Time: 4 to 6 hours for talks and planning with 1 additional day for the management plan

Materials: For Each Group

- Books with pictures of wildlife and plants
- Books and pamphlets concerning wildlife habitats (see Resources and direction 5)
- Colored pencils
- Data Sheets

Directions

1. Contact, or let the students contact, one or more local individuals or groups involved with encouraging city plant and animal populations; e.g., garden clubs, environmental associations, Audubon Society, State Department of Natural Resources, Cooperative Extension Service, Parks Department, and others.

2. Invite representatives of these groups in to discuss planning for urban wildlife. What does the organization do to help wildlife? Ask the speakers to bring pictures or slides.

3. Help the group choose a site to develop a management plan. The area need not be large; areas the size of a window box or the size of a city park can be managed for wildlife. Part of a schoolyard, park, vacant lot, right-of-way, or cemetery can be used. Try to choose an area that will not be disturbed when the students implement their plan. Be sure to obtain any necessary permission from the owner or proper authority (principal, neighborhood association, cemetery manager, etc.) and write a thank-you note after the field trip.

4. Divide students into small groups and instruct them to draw maps of the area noting its good and bad points as wildlife habitat.

5. Encourage the students to look through the books and pamphlets you have available and to develop a list of species that can live in the habitat and ones they would like to see more often. Discuss with the students the positive and negative aspects of increasing these species. Using their maps, they should design a management plan for these species. This is surprisingly easy to do, and there is a lot of help available. The plans need not be complex. They should include ideas for reducing pollution on the site if possible and for increasing diversity of wildlife habitat by providing self-sustaining sources of food, water, and cover.

Habitat improvements can include: allowing a grassy area to "go wild" (the taller grass will provide food and cover), providing nest boxes for squirrels, and planting shrubs for food and cover or as a buffer between a busy area and your "refuge."

Natural food sources (vegetation) are recommended over artificial feeders because they require less maintenance.

Discuss undesirable species in the management areas and how they can be discouraged (e.g., reduce their habitat, remove garbage).

6. Should you decide to carry out one of the management plans, check with your State Department of Natural Rescurces or Cooperative Extension Service about sources of plants.

As a guide for developing the plans, use information gained from your class speakers. Additional information is available from the Soil Conservation Service, Forest Service, National Wildlife Federation, and from books listed under Resources in the Overview.

Also check with local nurseries. Often local nurseries will donate seeds, seedlings, or shrubs for classroom school projects. Larger seedlings will have a better chance of survival. Your supplier should demonstrate the proper planting techniques.

If the plan is not implemented as a class activity, encourage students to apply some of their planning principles in their own yards or window boxes where this is possible.

Review Answers

1. Most answers will be correct. The question asks for information as well as the students' preferences. Students should list desirable species that might conceivably occur in their parks (e.g., squirrels, butterflies, chickadees, rabbits, robins, cardinals, sumacs, sunflowers, ornamental cherry trees).

2. Examples:

a. Let grasses grow tall to provide cover and food for animals.

b. Plant shrubs between the vacant lot and street traffic to provide a buffer zone.

c. Provide a birdbath or other water source.

d. Plant nut trees and berry-producing shrubs for wildlife food.

3. Students should name two organizations or departments they contacted, such as the Department of Natural Resources, Audubon Society, or Extension Service.

4. True. Even small yards or window boxes can attract wildlife as long as habitat requirements are met.

5. 1-c. Nuts, such as acorns or hickory nuts, are important in the diets of squirrels.

2-a. Turtles sun themselves on rocks and logs in ponds.

3-b. Grass seeds provide food for many birds. The taller grasses also provide cover for feeding birds.

Name:

1. In my "wildlife park" I would like to see:

a. _____

b. _____

c. _____

2. Name two ways you can improve a vacant lot or yard for wildlife.

a. _____

_____

b. _____

_____

3. What are the names of two groups (organizations) involved with helping plants and wildlife in your city?

a. _____

b. _____

4. Is this statement true or false?

Wildlife isn't found only in large areas such as parks; it can also be attracted to smaller places. (Circle your answer.)

True **False**

5. Match the animals (Column A) with a technique used to manage them (Column B).

A	B
1. Squirrels	a. Build a pond with rocks and logs.
2. Turtles	b. Allow grass areas to go to seed.
3. Birds	c. Plant trees that produce nuts.

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Name:

You are collecting information about conditions animals and plants need to be able to live. Can you find these conditions in your city? Where? In a natural area or in a developed one?

Animals' Needs	Natural Area	Developed Area
Water Can rainwater soak into the ground for plants to use? Is drinking water available for animals (puddles, dripping faucets, etc)?		
Food What is there for animals to eat? Berries and nuts from shrubs or trees? Leaves? Insects? Earthworms? Garbage? Seeds?		
Cover Are there places (rocks, bushes, tall grass) for animals to hide from predators, hot sun, people, and other dangers?		
Nesting Places Where could animals raise their young? Trees, underground burrows, dense shrubs, building ledges?		
Soil Is there soil here? If so, is it packed hard so plant roots would have difficulty growing?		
Temperature (sunny day activity) Hold your thermometer for 3 minutes at ground level. (Do not put your finger on the bulb.) Record the temperature.		

Name:

Animals' Needs	Natural Area	Developed Area
Noise Is this place noisy? If you stand 1 meter (3 feet) from a classmate, do you both have to raise your voices to talk to each other?		
Traffic Are there a lot of people moving around? Are there bicycles, cars, or buses?		
Transportation If animals cannot fill all their needs here, can they get safely to another place? How?		
Plants What plants do you see? How did the plants get there?		
Animals What animals do you see? What animals do you think might be here even if you cannot see them?		

Did you include humans in your list of animals? They, too, live in the city habitat. Tell below how people survive in this habitat. Use your Data Sheet as a guide.

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Urban Areas **Activity 2** **Data Sheet**

Name:

	Can you find evidence of this pollutant? Where? How?	Source	Effect on people	Effect on animals and plants
Observation A Air pollution particles				
Observation B Acid rain pollution (sulfur dioxide)				
Observation C Noise pollution				
Observation D Car exhaust pollution (ozone)				
Observation E Oil pollution				
Observation F				
Observation G				
Observation H				

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Name:

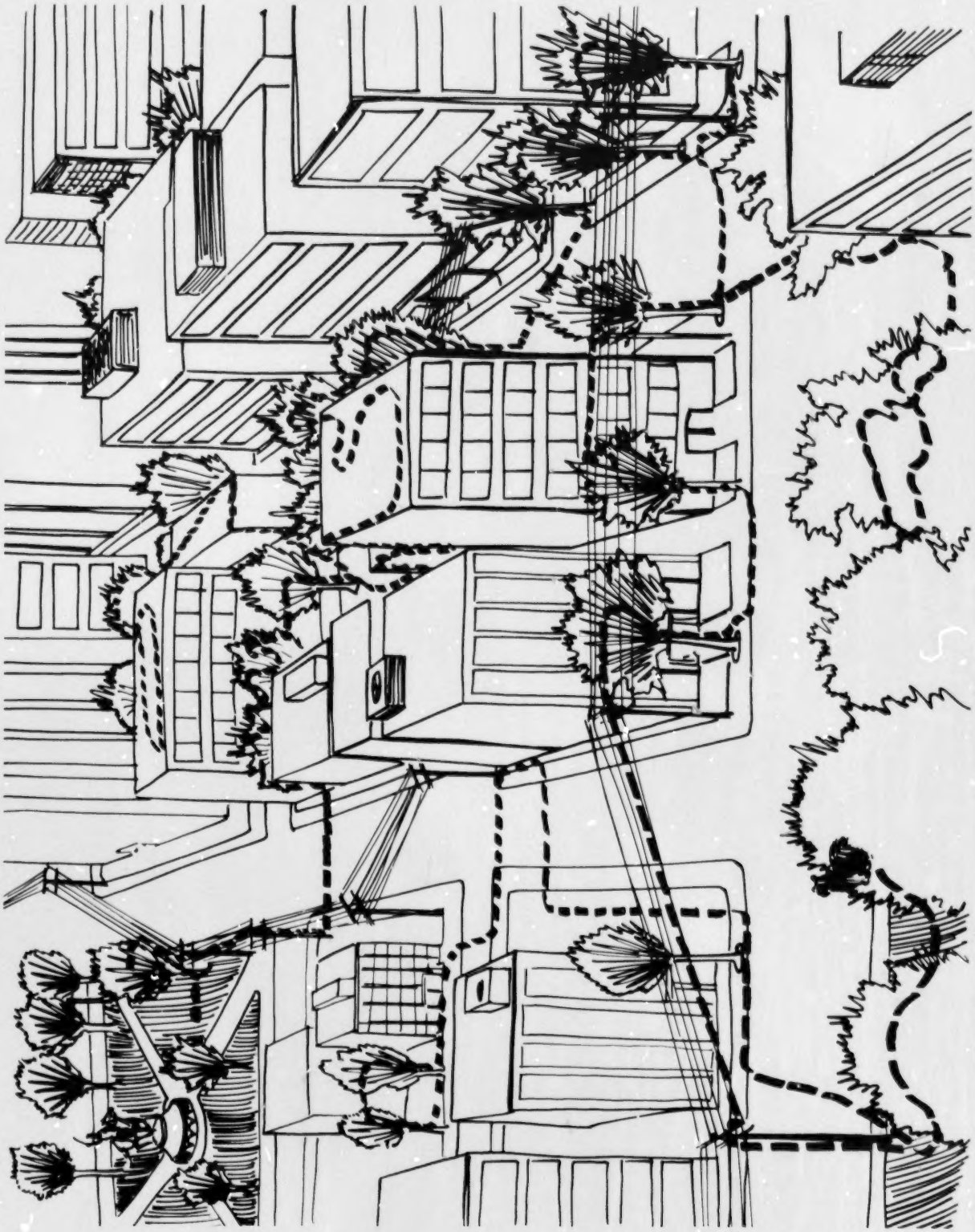
Management Area

Draw a map of your management area. In another color draw the changes you would make to improve this habitat for wildlife. Use the back of the Data Sheet if you need a larger space for your map.

Department of the Interior/U.S. Fish and Wildlife Service, 1982

Name:

Can you help the squirrel reach the park?



Name:

How many different kinds of wildlife can you spot around town? Keep a record here of what you see and the date when you saw it. Write birds in the first column, mammals in the middle column, and other animals (insects, spiders, worms, reptiles, amphibians, or fish) in the last column. Be the first to fill up your log. Share it with family, friends, and others.

DATE	BIRDS